Wisconsin Highway Research Program
Request for Proposal for

Repair and Strengthening of Bridge Substructures

Proposals must be submitted
no later than
Wednesday, March 3, 2010

For further information regarding this RFP
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Researcher Proposal Preparation Guidelines

WHRP Proposal Guidelines are available on the WHRP website (http://www.whrp.org/rfps-and-guidelines.html?current=three&sub=none). Please refer to these instructions in preparation of your response.

I. Background and Problem Statement

Deterioration and/or damage to bridge substructures is a common occurrence. Effective long term repair of these issues is critical to preserving our infrastructure and providing a more cost-effective approach to bridge management. Unfortunately, useful information on damage assessment and repair strategies is deficient and scattered.

The Wisconsin Department of Transportation (WisDOT) seeks to develop guidelines for both assessment techniques as well as recommended maintenance actions for repair activities to improve the condition for damaged or deteriorated bridge substructures.

II. Objectives

The objective of this project is to explore both assessment and repair strategies for bridge substructures subjected to either damage or deterioration and develop a guideline for assessment and repair of substructures to be utilized by the Wisconsin Department of Transportation (WisDOT).

III. Scope of Work

The research shall be broken down into the following tasks:

Task 1: Collect, review, and interpret relevant practice, performance data, research findings, and other information related to the assessment and repair of bridge substructures subjected to damage and/or deterioration.

Task 2: Conduct a survey of State DOT's with similar climates and soil conditions, as well as WisDOT regional bridge engineers and WisDOT bridge contractors, to ascertain current assessment practices and repair techniques and the relative effectiveness of each. Some field visits to existing WisDOT bridges with various substructure issues and subsequent repairs will be required as a part of this task.

Task 3: Prepare an interim report that summarizes the key findings of Tasks 1 and 2. Submit this report and revised work plan to the project oversight committee within 9 months of project start date for review and approval.

Task 4: Develop a guidebook with recommendations on assessment strategies and repair techniques as well as a decision matrix for when to use specific methods of assessment and repair.

Task 6: Identify future research needs to expand the findings of this project

Task 7: Submit a draft final report three (3) months prior to end of contract for Technical Oversight Committee (TOC) review. Present findings to TOC.

Task 8: Revise and submit final report.

IV. Specific Results, Findings, Tools, etc. (Deliverables)

Reporting Requirements: 36 hard copies of final report delivered to WHRP by the contract end date. The developed guidebook shall be an Appendix to the report and shall be written in a stand-alone format for inclusion as a chapter in the WisDOT Bridge Manual.

Presentation Requirements: All projects require the PI to give a closeout presentation after submittal of the draft final report. This presentation will be given to the TOC prior to completion of the project.

V. Budget and Time Frame

The project shall be completed in 18 months with a budget not to exceed $77,000. An interim report detailing the findings of Tasks 1 and 2 as well as a detailed and updated work plan for future tasks shall be submitted no later than 9 months after the project start date. The draft final report shall be submitted 3 months prior to end date of project to allow time for TOC review and comments.

VI. Implementation

The project will have immediate usefulness to WisDOT bridge maintenance engineers who will be able to use the guidelines for developing repair strategies on deteriorated bridges.

Information from this report will also be used in the WisDOT Bridge Manual as well as the WisDOT Structure Inspection Manual.

VII. Special Notes

- Substructure issues should address at a minimum:
  - Foundation problems (Settlement, scour, drainage)
  - Piling issues (collision, ice flow, freeze-thaw, splash zone damage, microbial, etc.)
  - Pile caps (deterioration, damage)
  - Abutments (rotation, cracking, undermining)
- All major materials should be addressed (timber, steel, concrete)
- Research team should consider both traditional as well as the latest methods of repair for all substructure types. Strengthening should also be considered.
- Assessment techniques should include but not be limited to:
  - Visual surveys
  - Delamination surveys (soundings, impact echo, etc.)
  - Chlorine Ion content and corrosion potential testing
  - NDE methods
- Repair methods for pile deterioration should be wide ranging (traditional patching, concrete jackets, FRP wraps, cathodic protection, etc.)
- Repair guidelines should include but not be limited to:
  - application
  - suitability depending on damage and/or deterioration location
  - durability
  - cost benefit

- No laboratory testing is envisioned for this phase of the project. However, PI will be encouraged to develop a research plan in the final report for testing the durability of repair methods selected in guidebook for future projects
- Travel will be required to visit bridge sites, to meet with the project oversight committee as needed, and to present the report.